SPACE VECTOR PWM MODULATOR FOR PERMANENT MAGNET MOTOR DRIVE

ABSTRACT OF THE DISCLOSURE

A space vector pulse-width modulator (SVPWM) and a method implemented by the modulator. A precalculation module accepts Ua and Ub modulation indexes and in response thereto, outputs modified Ua and Ub information; a sector finder has a U module which receives the modified Ua information and outputs a U sector; and a Z module which receives the U sector and the modified Ub information and outputs a Z sector. The U sector and the Z sector are 2-phase control signals for implementing 2-phase modulation. For 3-phase modulation, the SVPWM and method further possess an active vectors calculation module and an assign vectors module which receive the modified Ua and Ub information and the U sector, and which calculate active vectors for 3-phase modulation; a zero vector selector which receives the Z sector and calculates zero vectors for 3-phase modulation; and a PWM counter block which receives the active vectors and zero vectors and outputs 3-phase control signals for implementing 3-phase modulation. The SVPWM and method may have a symmetrical PWM mode, an asymmetrical PWM mode, or both. Advantageously there may also be a rescale and overmodulation module which receives duration information corresponding to the vectors and in response thereto, detects the occurrence of overmodulation. Overmodulation may be detected in response to a negative zero vector time. The module may respond to overmodulation by clamping the zero vector time to zero and rescaling the active vector times to fit within the PWM cycle. The rescaling may restrict a voltage vector to stay within hexagonal boundaries on the space vector plane, while preserving voltage phase.